agree with Prof. Edgeworth when he points out where other things are equal an employer is likely to have a preference for the male owing to the "secondary" drawbacks of the female. Prejudice and restricted opportunities may be responsible for what truth there is in the charge that "a woman is not so useful in the case of a breakdown or a runaway." But it is quite indisputable that the probability of her early marriage is a real drawback to a woman's industrial efficiency. These secondary differences, however, are so difficult to measure accurately that the reduction on their account of the woman's rate per unit of work below that of the man is not a wise or scientific policy. It is better to allow them to make their influence felt upon the occupational distribution of the sexes rather than upon their pay. Of the "tertiary" differences also (of which the illustration given is "the presence and influence of a master—as contrasted with a mistress—in dealing with the bigger boys") the same is true; but there is no evidence to show whether these tertiary differences predominantly favour the male rather than the female.

We now restore the abstracted circumstances of family life. A man normally has, or expects to have, a family to support; a woman normally has not. While the average number of dependants supported by a woman from her earnings has often been greatly underestimated, there is certainly no disputing the general result of Messrs. Rowntree and Stuart's figures, which show that this average is much higher for a man than for a woman. The candid will admit that here is the real obstacle to equal pay for equal work; the logical will consider the possibilities of endowment of motherhood as a way out of the difficulty. Prof. Edgeworth summarises the *pros* and *cons* of State endowment of motherhood as follows. The proposal is attractive because (1) it would for the first time make competition between the sexes both free and fair; and (2) it would make possible the distribution of resources in such a way as to meet the requirements of the larger family better than is done at present, when the wage paid to a man tends to be adjusted to the presumption that he maintains a family of approximately 4·4 persons, which he quite certainly does not. Against these advantages Prof. Edgeworth sets the following: (1) the scheme is socialistic and bureaucratic, (2) it would almost certainly involve a transference of resources from the rich to the poor and would therefore probably check saving, (3) the effect on the contributor would be "depressing," and there would be (4) a great stimulus to population, and (5) no security for the improvement of the race, but only a prospect of "the ruin of the great middle class to which England owes so much."

We gather that Prof. Edgeworth regards these disadvantages as conclusive. He turns from the State endowment of motherhood to consider one or two other suggestions, the principal of which is his own proposal that the members of Trade Unions might themselves contribute a quota of their earnings to a fund to be distributed among the wives of members in accordance with the size of their families. In regard to this proposal Prof. Edgeworth does not commit himself beyond the canny statement that it would be much less open to objections than the endowment of motherhood by the State.

Prof. Edgeworth's address is open to little criticism from those who grant his premises. All will applaud his careful analysis of his subject. It is, however, at least open to question whether his whole treatment of the matter does not suffer immensely from the limitations which he has imposed upon himself. In his first approximation the assumption that "regulated competition" (a very vague concept) is a royal road to ideal distribution is open to serious criticism. Secondly, any discussion of endowment of motherhood which assumes outright that (*a*) transferences of resources from rich to poor would be entailed, and that (*b*) these are objectionable, rests on questionable ground. To the present writer this double assumption appears fatal to Prof. Edgeworth's conclusions regarding the right relation of the basis of payment to family circumstances.

BARBARA WOOTTON.

Fishing and Fishing Lore.

Fishing from the Earliest Times. By W. Radcliffe. Pp. xvii + 478. (London: J. Murray, 1921.) 28*s.* net.

THE literature connected with fishing is already so extensive that a new volume is liable to be subjected to scrutiny to see whether it can justify its birth by furnishing new matter or new ideas. As the more obvious gaps in the literature of the subject become fewer, the tests will necessarily become more searching. Mr. Radcliffe's book, fortunately, can claim a definite *raison d'être,* and may receive an enthusiastic welcome as filling a decided gap, one which it is curious should have so long remained void. His aim has been to provide a history of the fishing art and craft from the earliest times down to about A.D. 500. The title scarcely does justice to the contents of this versatile volume, which is far from being restricted to the consideration of actual fishing practices. These, indeed, probably occupy but a third of the book. The remainder is very largely concerned with what may be classed as the folk-lore associated with fish, fishing, fishermen, and fish-consumers. and with other details which are by-products of the industry. Mr. Radcliffe has been at great pains to bring together a great mass of material which he has collated and coaxed into a very readable form. The illustrations are both good and numerous. The result is an important work which is both entertaining reading, and of considerable value as a comprehensive book of reference. In the main, it consists of classified quotations which are analysed and evaluated by the author. One would gather that the author has thoroughly enjoyed his self-imposed task. He revels in argument, and while now and then he may, perhaps, be suspected of "special pleading," his interpretations of doubtful or obscure passages are always interesting and suggestive, even when he fails to be entirely convincing.

The introduction extends over sixty pages and deals with a number of points of general interest and with early prehistoric fishing. For our knowledge of fishing practices during the Stone and Bronze Ages we are dependent upon evidence which is, unfortunately, meagre in amount, and requires much speculation for the completion of the picture. Mr. Radcliffe has not made an intensive study of fishing as practised by *recent* Stone-age peoples, and he makes but slight use of the evidence which they can afford, valuable though it may be for the light which it can throw upon the archæological record. Ethnological data must be brought to bear upon archæological research if an adequate diagnosis of early customs and appliances is to be achieved. A comprehensive work dealing with fishing pursuits and methods among the recent "unrisen" peoples, the progress of whose more or less primitive culture has been arrested or retarded at various stages of advancement, still remains to be written. When such a work, based upon comparative study, is available, archæological commentarists will find a valuable ally which will assist materially in their interpretations of ancient data.

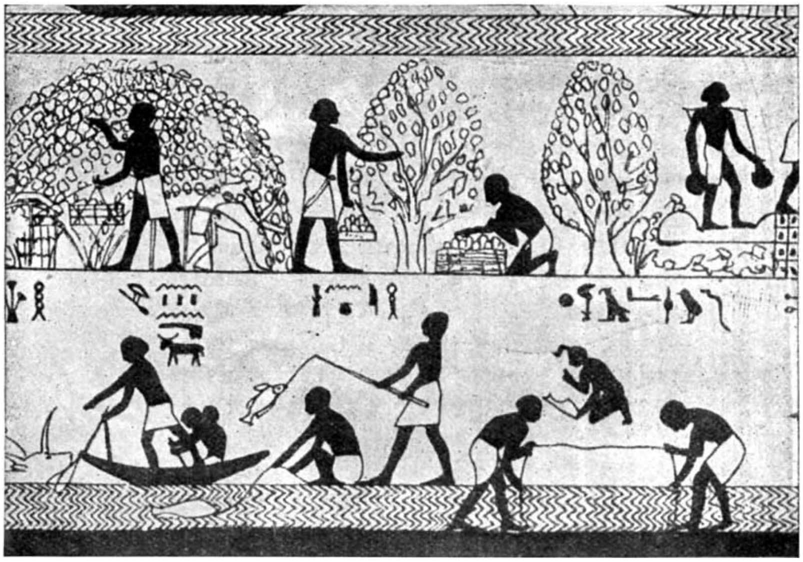

FIG. 1.—The earliest representation of angling, *c.* 2000 B.C. From "Fishing from the Earliest Times."

The present volume would have gained by a wider reference to evidence derived from ethnological sources, and some of the problems with which Mr. Radcliffe deals so interestingly might have been more convincingly attacked or solved. Mr. Radcliffe takes especial delight in tracing the earliest references to various fishing-appliances. [See Figs. 1 and 2 here reproduced by the courtesy of the publishers.] To Martial he assigns the first mention of the jointed rod (*crescens harundo*), and of fishing with a fly; but to Ælian the first definite reference to the use of an *artificial* fly. In dealing with the latter, he appears to be convinced that the artificial fly of those days was an imitation, as close as possible, of a *natural* fly; but this view does not seem to be borne out by Ælian's description, which rather suggests the reverse, *i.e.* a type of lure which was a novelty to the fish, which were attracted by its unusual gaudiness. Aristotle is given credit as the first "scale-reader" in estimating the age of fishes. There seems to be a zoological confusion when Mr. Radcliffe uses evidence from two passages, one of which refers to the *scales* of fish which afforded an indication of age, while the other relates to the growth indications upon the *shell* of a Murex (a mollusc). But zoological differentiation is scarcely Mr. Radcliffe's strong point, and he apparently is convinced that dolphins are to be classed with the fishes (pp. 91, 92, 95, 165, 450, etc.), and this in spite of the fact that Aristotle, whom he quotes, recognised essential differences between fish and cetacean mammals. The plate opposite p. 180 is described as illustrating a "pattern of Torpedo fish"; but the three fishes represented clearly belong to three distinct varieties, all of them *bony* fishes, whereas the Torpedo fish (a kind of ray) belongs to the group of *cartilaginous* fishes. Again, on p. 414, he includes shell-fish among the fishes prohibited by Moses, without any covering comment. These "termino-zoological inexactitudes" tend somewhat to obscure the scientific status of the book.

A time-honoured controversy is revived and reviewed in detail in chapter 2, where the author deals with the various interpretations of the function of the ox-horn (*κερας βοὸς ἀγραύλοιο*) referred to in the "Odyssey"

(xii. 251 ff.) and "Iliad" (xxiv. 80 ff.) in connexion with similes derived from fishing processes. The very varied theories are quoted and evaluated with skill, and the author himself inclines toward the suggestion of C. E. Haskins, namely, that the κέρας was an artificial bait of horn. This controversy has been carried on in the pages of the *Times* Literary Supplement, in reviews of the book, and in letters arising therefrom. The whole discussion, however, leaves one unconvinced and still wondering. Since the controversy still remains "fluid," I am tempted to offer yet another possible solution, to take its chance with those previously offered. Line-fishers on the coast of Western Ireland employ a very simple and ingenious contrivance to overcome the difficulty which arises from their hooks becoming entangled in seaweed, when fishing is pursued in rock-studded waters. It is desired to sink the baited hook below the level of the weed layer, and the problem is to pass it through the tangled and entangling mass. To achieve this, at a short distance above the hook there is attached to the line a crab's claw, which serves as a stop. Still farther up the line a weight (or sinker) of lead or stone is fastened, and between the stop and the weight an empty carapace of a crab is loosely threaded upon the line, so that it can slide along the latter between the sinker and the stop. When the line is cast out by the fisherman, the weight descends first, dragging after it the line; the water-resistance causes the bell-like carapace to slip along the line as far as the stop, so that it covers and protects the baited hook as it is carried downward through the weed stratum. Since the carapace is very light it probably floats away from and uncovers the bait when the line becomes stationary at the desired depth. Similarly, as the line is drawn in the resistance of the water drives the bell down over the hook and again protects it on the upward journey. Now, substitute a selected bell-shaped ox-horn for the crab's carapace and a slightly more efficient form of this apparatus is devised, which should serve the same purpose admirably.

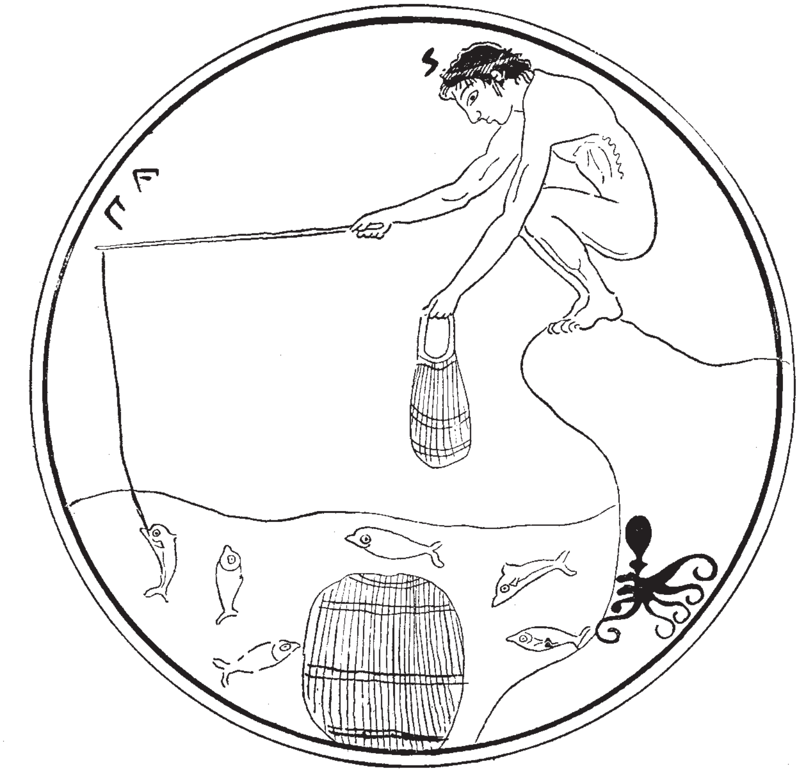

Fig. 2.—The happy fisherman, attributed to the artist Chachrylion. From "Fishing from the Earliest Times."

The merit, if any, of my suggestion is derived from the following facts, (1) that the apparatus which affords a seeming clue to the function of the κέρας is an actual one still in practical use locally, and is very possibly a survival from an ancient type formerly far more widely employed; (2) that the much-debated "resounding splash" (cf. στονάχησε δὲ λίμνη in the Iliad passage) is plausible as a description of the effect produced by casting such an apparatus into the sea; (3) that it is consistent with fishing from a headland on a rocky and weedy coast such as, I believe, is characteristic of southern Italy and of the region lying between Samos and Imbros, the areas to which Homer's two similes are applied; (4) that it conforms with the picturesque description of the dive of Iris when she "sped to the bottom like a weight of lead, that mounted on the horn of a field-ox goeth down, bearing death to the ravening fishes"; (5) that the κέρας βοὸς ἀγραύλοιο which some commentators aver must imply the *whole* horn, and not merely an object made of horn, would, for the purpose I have suggested, have been practically entire, so that the hook could be withdrawn into its protecting cavity. A small hole drilled in the apex (through which to pass the line) would be the only essential modification required. The expression "mounted *on* the horn" alone offers some difficulty; "near" or "with" instead of "on" would certainly have added weight to my suggestion.

The problems suggested by or dealt with in this book are numerous, and Greek, Roman, Egyptian, Assyrian, Jewish, and Chinese fishing methods and fishing lore all receive detailed and careful treatment. The author has brought to bear upon his task the experience of a practical and enthusiastic angler, and the zest of a keen student. While he realises the more serious aspects of his theme, he has dealt kindly by the general reader and writes in a light-hearted, attractive, and unpedantic manner. In this way he should be instrumental in developing a wider interest in and stimulating further research into the history of one of the oldest industries, and has given us the story of progress from a humble and despised craft to a popular and respected art.

HENRY BALFOUR.

The Metallurgy of Iron and Steel.

(1) *Engineering Steels.* By Dr. L. Aitchison. (Reconstructive Technical Series.) Pp. xxxi + 348 + 48 plates. (London: Macdonald and Evans, 1921.) 25*s.* net.

(2) *The Case-Hardening of Steel: An Illustrated Exposition of the Changes in Structure and Properties induced in Steels by Cementation and Allied Processes.* By H. Brearley. Second edition. Pp. xi + 207. (London: Longmans, Green and Co., 1921.) 16*s.* net.

(3) *Iron-Founding.* By B. Whiteley. (Pitman's Common Commodities and Industries.) Pp. 131. (London: Sir I. Pitman and Sons, Ltd., 1921.) 3*s.* net.

(1) THE advance of metallurgy in recent years has placed at the disposal of the engineer a wide range of new materials, including alloy steels which so far surpass the older, plain carbon steels in strength and toughness as to constitute a new class of metals. In the face of such diversity the engineer finds difficulty in selecting the most suitable material for a given purpose, and is not in a position to judge between the products offered by manufacturers, or recommended by specialists. There are in existence many excellent memoirs and a few books on the subject, but they are written for the metallurgist, and assume a technical knowledge that lies outside the usual field of study of the engineer. It is highly desirable that the user of a metal should understand its properties as well as the maker, and Dr. Aitchison has made the attempt, largely successful, to describe the steels now available for engineering purposes, without assuming a knowledge of chemistry or metallurgy.

The title of Dr. Aitchison's book must be interpreted in a rather restricted sense. The engineer is interested in such steels as those used for ship and boiler plates, rails, and girders, but he will find little in reference to them, the work being mainly concerned with steels required by the automobile and aircraft industries. It is these steels of high tensile strength, often required to withstand severe alternating stresses, that present the greatest difficulties of specification and testing, and it is very necessary that the information regarding them should be collected and placed clearly before the engineering user, as has been done here. There is a very brief account of methods of manufacture, sufficing to indicate the distinction between various classes of steel, and a discussion of ingot structure, so far as is required to explain the possible sources of defects in forgings.

It is probably on account of the limitation mentioned above that only piping steel is described, and the subject of blowholes is not mentioned. Steel castings are omitted entirely, although of great interest to the engineer who uses high tensile steel forgings for other parts of his machine. The desire to avoid chemical and metallurgical difficulties leads to a somewhat excessive simplification of the chapter on heat treatment, and the author's account of hardening and his explanation of the critical points is rather misleading, although not likely to cause misunderstanding of the practical instructions. It should be said that the style is easy and readable throughout.

The subject of mechanical testing is well treated, proper attention being given to the determination of the fatigue range and its relation to the other measurements usually made in the testing laboratory. Much of the experimental material in this chapter is taken from the author's reports to the Aeronautical Research Committee. His conclusions may not always be accepted, but the importance of the subject is rightly emphasised, and the descriptions of fatigue tests and the short accounts of other special methods of testing are valuable. There are very few references to original sources, but a full bibliography of papers relating to the determination of hardness is given.

The alloy steels are considered in detail, the properties of each steel, as modified by different heat treatments, being shown by means of diagrams similar to those published by the Automobile Steel Research Committee; these diagrams provide a useful guide to the characteristics of the various classes of steels. Case-hardening and cold-working are other subjects dealt with.

The book is very well printed and illustrated, many of the best plates being selected from Mr. Brearley's works, while others show special types of testing machines. The whole subject of the relative value of tests for steels of this class is in a state of flux, and an authoritative statement is not yet to be expected, but Dr. Aitchison has made a good beginning, and his efforts will be welcomed by engineers.

(2) The first edition of Mr. Brearley's book on case-hardening was published in 1914, and it is an indication